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MACTEC ENVIRONMENTAL RESTORATION SERVICES, LLC

Spectral Gamma-Ray Borehole
Log Data Report

Log Event A

Borehole 30-00-03

Borehole Information

Farm : C	**Tank :** C	**Site Number :** 299-E27-54
N-Coord : 42,771	**W-Coord :** 48,149	**TOC Elevation :** 651.57
Water Level, ft :	**Date Drilled :** 1/31/1945	

Casing Record

Type : Steel-welded	Thickness, in. : 0.500	ID, in. : 12
Top Depth, ft. : 0	Bottom Depth, ft. : 54	
Type : Steel-welded	Thickness, in. : 0.313	ID, in. : 8
Top Depth, ft. : 0	Bottom Depth, ft. : 155	

Cement Bottom, ft. : 155 **Cement Top, ft. :** 154

Borehole Notes:

This borehole was drilled in December 1944 and January 1945 and was completed to a depth of 155 ft with 8-in. casing. The 8-in. casing extends from the top of the borehole (approximately 2.5 ft above ground surface) to a depth of 154 ft. A string of 12-in. surface casing is also present from about 2 ft below the top of the borehole and extends (according to the driller's log) to a depth of 54 ft. The space between the outer 12-in. and inner 8-in. casing may be grouted, although the driller's log contains no mention of grout in this interval. The driller's log does indicate that the borehole was perforated between 54 and 154 ft with five perforations per foot, and that the bottom 8 in. of the borehole was grouted with half a bag of cement.

The zero reference for the SGLS logs is the top of the 8-in. casing. This borehole is located on the side of a hill with the top of the 8-in. casing approximately 2.5 ft above the slope of the hill. The top 2.5 ft of the borehole was not logged. The top of the 12-in. casing is approximately 0.5 ft above the slope of the hill. The current depth of the borehole, as verified with an electrical tape, is 118.8 ft. There is no information given as to when or how the bottom portion of the borehole was filled.

Equipment Information

Logging System : 1	**Detector Type :** HPGe	**Detector Efficiency:** 35.0 %
Calibration Date : 10/1996	**Calibration Reference :** GJO-HAN-13	**Logging Procedure :** P-GJPO-1783

Log Run Information

Log Run Number : 1	**Log Run Date :** 04/15/1997	**Logging Engineer:** Alan Pearson
Start Depth, ft.: 2.5	**Counting Time, sec.:** 100	**L/R :** L **Shield :** N
Finish Depth, ft. : 15.0	**MSA Interval, ft. :** 0.5	**Log Speed, ft/min.:** n/a

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Log Run Number :	2	**Log Run Date :**	04/16/1997	**Logging Engineer:**	Alan Pearson
Start Depth, ft.:	118.5	**Counting Time, sec.:**	100	**L/R :** L	**Shield :** N
Finish Depth, ft. :	33.0	**MSA Interval, ft. :**	0.5	**Log Speed, ft/min.:**	n/a

Log Run Number :	3	**Log Run Date :**	04/17/1997	**Logging Engineer:**	Alan Pearson
Start Depth, ft.:	34.0	**Counting Time, sec.:**	100	**L/R :** L	**Shield :** N
Finish Depth, ft. :	14.0	**MSA Interval, ft. :**	0.5	**Log Speed, ft/min.:**	n/a

Analysis Information

Analyst : D.L. Parker

Data Processing Reference : P-GJPO-1787 Analysis Date : 05/15/1997

Analysis Notes :

This borehole was logged in three log runs using a centralizer. Spectra were not collected in the top 2.5 ft of the borehole. The pre- and post-survey field verification spectra met the acceptance criteria established for peak shape and system efficiency. The energy and peak-shape calibration from the field verification spectra that best matched the data were used to establish the peak resolution and channel-to-energy parameters used in processing the spectra acquired during the three log runs. There was some gain drift and it was necessary to adjust the established channel-to-energy parameters during processing of log data to maintain proper peak identification.

This borehole is double-cased between depths of 0.5 and 54 ft. An appropriate casing correction factor for the double-cased portion of the borehole could not be applied because of the attenuation caused by the double-steel casings in this interval and the potential for grout between the two casings.

A casing correction factor for a 0.330-in.-thick casing was applied during the analysis of borehole data. This correction factor most closely matches the actual thickness of the 8-in. casing. Use of this casing correction factor will cause the radionuclide concentrations to be overestimated below the double-cased portion of the borehole, and significantly underestimated in the double-cased portion of the borehole.

Cs-137 was the only man-made radionuclide detected in this borehole. Cs-137 contamination was detected intermittently from 2.5 to 16.5 ft and almost continuously from 55.5 to 118 ft. The maximum measured Cs-137 concentration was approximately 1.8 pCi/g at a depth of 118 ft. Apparently higher concentrations were detected in the double-cased portion of the borehole; however, an actual concentration cannot be calculated for the reasons described previously.

The logs of the naturally occurring radionuclides show an increase in K-40 and Th-232 concentrations at about 56 ft. The logs show a slight decrease in K-40 and Th-232 concentrations between depths of about 70 and 90 ft. K-40 concentrations gradually increase from 85 to about 106 ft. Th-232 concentrations increase below a depth of about 99 ft and decrease again below a depth of about 111 ft.

Details concerning the interpretation of data for this borehole are presented in the Tank Summary Data Reports for tanks C-102 and C-103.

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Log Plot Notes:

Separate log plots show the man-made and the naturally occurring radionuclides. The natural radionuclides can be used for lithology interpretations. The headings of the plots identify the specific gamma rays used to calculate the concentrations. Uncertainty bars on the plots show the statistical uncertainties for the measurements as 95-percent confidence intervals. Open circles on the plots give the MDL. The MDL of a radionuclide represents the lowest concentration at which positive identification of a gamma-ray peak is statistically defensible.

A combination plot includes the man-made and natural radionuclides, the total gamma derived from the spectral data, and the Tank Farms gross gamma log. The gross gamma plot displays the latest available digital data. No attempt has been made to adjust the depths of the gross gamma logs to coincide with the SGLS data.